

Figure E.9. Human Health Risk Estimate for the Agricultural Resident Scenario



Figures E.1-E.9 follow the format described in Section 5.2 for Figures 5.5-5.6. As with the figures in Section 5.2, the absolute values of the risk estimates may be quite high. As described in Section 5.2, the absolute magnitude of the estimated risk merely indicates potential areas of concern because the estimates are based on conservative assumptions and do not apply to any real human populations at this time. However, the actual results are provided for readers wishing to understand the nature of the screening level calculations performed for this assessment. The results of the screening assessment of human risk will be used to support cleanup decisions and to focus a subsequent and more comprehensive risk assessment.

The numerical results of the calculations are provided to the reader on diskette. The diskette contains all of the output from the input files described in the previous section. The calculations run were both deterministic (single valued input and output) and stochastic (parameters varied over their expected ranges). Both sets of results are provided. The results of the deterministic calculations are provided in the self-extracting, compressed file "determ.exe." Additional details for each of these cases are provided in the self-extracting, compressed file, "det_dtl.exe." The results of the stochastic calculations are provided in self-extracting, compressed file, "stochast.exe." Additional details for each of these cases are provided in the self-extracting, compressed file, "stoc_dtl.exe." The values found in these various files were used to make the summary spreadsheet, "results.xls." For the calculation results, the contents of the diskette are as follows:

<u>Filename:</u>	<u>File description</u>
determ.exe	Compressed, self-extracting file containing all of the calculational results of the HUMAN code runs for the deterministic simulations
det_dtl.exe	Compressed, self-extracting file containing secondary output from the deterministic runs, providing additional detail on the pathways and sources of exposure for each location and for each contaminant
stochast.exe	Compressed, self-extracting file containing all of the calculational results of the HUMAN code runs for the stochastic simulations
stoc_dtl.exe	Compressed, self-extracting file containing secondary output from the stochastic runs, providing additional detail on the pathways and sources of exposure for each location and for each contaminant
results.xls	Microsoft Excel 5.0 file of the numerical results as well as the graphical displays of those results (Figures E.1-E.9) by scenario

Computer Code for the Statistical Analysis of Downstream/Upstream Comparisons and the Results

As described in Section 5.2, the human risk results at Hanford-influenced locations were compared with those estimated for an upstream and, therefore, presumably minimally contaminated location (Segment 1). Section 5.2.4 (Figures 5.36 and 5.37) provided graphical summaries of the results of the statistical evaluation for the Ranger and Native American Subsistence Resident scenarios, respectively. The other scenarios are summarized in Figures E.10-E.18. (Graphics are not provided for the Columbia River Island User Scenario



because this scenario was only evaluated at the point of highest cobalt-60 particle contamination, the island immediately downstream of the 100-D Area. Therefore, the risk results are not presented for the other segments.)

Because the distributions hold more information than can be easily used, techniques for comparing the entire upstream and downstream distributions were developed. These techniques were based on detailed statistical approaches called the Mann-Whitney U Test and the Kruskal-Wallis One-Way Anova Test (Gibbons 1971).

A computer code to implement the Kruskal-Wallis and Mann-Whitney statistical tests (RISKS) was prepared. The RISKS code was developed under quality assurance controls. Documentation of the code requirements, development specifications, development testing, and user's manual are available in the project records. An executable copy of the RISKS code is available on diskette with this report.

As input, the RISKS code used the output of the HUMAN code described earlier in this appendix. However, these files are too large to distribute. They may be reproduced using the HUMAN code and the input files provided. The input files used to make the calculations reported in Section 5.2 are provided on diskette. A summary of the results of the downstream/upstream comparisons is provided in the Microsoft Excel file ("updown.xls"). The contents of the diskette are as follows:

<u>Filename:</u>	<u>File description</u>
riskcode.exe	Compressed, self-extracting, executable RISKS code
riskkey.exe	Eleven compressed, self-extracting, input files used to control the RISKS code for each scenario
riskrpt.exe	Eleven compressed, self-extracting, output files containing the results of the downstream/upstream comparison calculations
updown.xls	EXCEL 5.0 file of the numerical results of the RISKS calculations as well as the graphical displays of those results (Figures 5.5-5.32) for each contaminant for the Ranger and Native American Subsistence Resident scenarios. (Figures 5.5 through 5.32 are based on the data in this file, but for publication the final figures in this report have been slightly edited from the versions on this diskette.)

Scenario Additivity

The scenarios presented in Section 5.1 and evaluated in Section 5.2 do not address all possible activities that could occur at Hanford. The scenarios were selected to provide a broad range of information, not to specify actual risk to real individuals. Generally, the several residential scenarios should cover most foreseeable exposures. However, for those interested in compound life styles, such as might occur with a resident of the downstream City of Richland who is also an avid recreational visitor, a simplistic approximation is provided to allow additional evaluations.

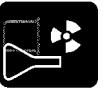


Figure E.10. Statistical Evaluation of the Differences Between a Segment Not Affected by Hanford Site Operations and Downstream Segments Affected by Hanford Site Operations for the Industrial Worker Scenario. (Under the analytes, chromium has two entries: “chromium-car” indicates chromium treated as a carcinogenic chemical and “chromium-tox” indicates chromium treated as a non-carcinogenic toxic chemical.)

[illegible]



Figure E.11. Statistical Evaluation of the Differences Between a Segment Not Affected by Hanford Site Operations and Downstream Segments Affected by Hanford Site Operations for the Fish Hatchery Worker Scenario. (Under the analytes, chromium has two entries: “chromium-car” indicates chromium treated as a carcinogenic chemical and “chromium-tox” indicates chromium treated as a non-carcinogenic toxic chemical.)



[illegible]



Figure E.12. Statistical Evaluation of the Differences Between a Segment Not Affected by Hanford Site Operations and Downstream Segments Affected by Hanford Site Operations for the Avid Recreational Visitor Scenario. (Under the analytes, chromium has two entries: “chromium-car” indicates chromium treated as a carcinogenic chemical and “chromium-tox” indicates chromium treated as a non-carcinogenic toxic chemical.)



[illegible]

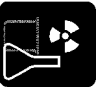


Figure E.13. Statistical Evaluation of the Differences Between a Segment Not Affected by Hanford Site Operations and Downstream Segments Affected by Hanford Site Operations for the Casual Recreational Visitor Scenario. (Under the analytes, chromium has two entries: “chromium-car” indicates chromium treated as a carcinogenic chemical and “chromium-tox” indicates chromium treated as a non-carcinogenic toxic chemical.)

[illegible]

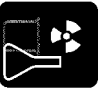


Figure E.14. Statistical Evaluation of the Differences Between a Segment Not Affected by Hanford Site Operations and Downstream Segments Affected by Hanford Site Operations for the Native American Upland Hunter Scenario. (Under the analytes, chromium has two entries: “chromium-car” indicates chromium treated as a carcinogenic chemical and “chromium-tox” indicates chromium treated as a non-carcinogenic toxic chemical.)

[illegible]



Figure E.15. Statistical Evaluation of the Differences Between a Segment Not Affected by Hanford Site Operations and Downstream Segments Affected by Hanford Site Operations for the Native American Hunter/Fisher Scenario. (Under the analytes, chromium has two entries: “chromium-car” indicates chromium treated as a carcinogenic chemical and “chromium-tox” indicates chromium treated as a non-carcinogenic toxic chemical.)



[illegible]

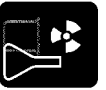


Figure E.16. Statistical Evaluation of the Differences Between a Segment Not Affected by Hanford Site Operations and Downstream Segments Affected by Hanford Site Operations for the Native American Gatherer Scenario. (Under the analytes, chromium has two entries: “chromium-car” indicates chromium treated as a carcinogenic chemical and “chromium-tox” indicates chromium treated as a non-carcinogenic toxic chemical.)

[illegible]